

Notice of Allowability

Application No.

10/697,768

Examiner

Henry S. Hu

Applicant(s)

THALER ET AL.

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment of May 10, 2005.
2. ☒ The allowed claim(s) is/are 1-42.
3. ☐ The drawings filed on _____ are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 5 pages
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

1. Applicants' faxed **amendment** filed on May 10, 2005 was received. Applicants' five **IDS** filed on June 20, May 16, April 15, March 25 and February 22 of 2005 with a total of five pages were also received. With the amendment, only dependent Claim 13 was amended to use the correct language of "pre-emulsion", while no claim was canceled or added.

With respect to specification objection (a) and (b), the Applicants have replaced the paragraphs beginning on page 2 at line 15 and page 5 at line 29. The examiner thereby withdraws the specification objections and claim objection in the previous Office Action dated January 10, 2005. **Claims 1-42 are now pending.** An action follows.

2. Claim rejections under 35 USC 102 and 103 rejections in previous Office Action filed on January 10, 2005 are now removed for the reasons given in paragraphs 3-9 thereafter.

Allowable Subject Matter

3. Claims 1-42 are allowed.

4. The following is an examiner's statement of reasons for allowance: The above Claims 1-42 are allowed over the closest references:

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5. The limitation of amended parent **Claim 1** of present invention relates to a method of aqueous emulsion polymerization of two or more fluoromonomers comprising the steps of: (1) forming a pre-emulsion by mixing $\text{CF}_2=\text{CF-R}^1\text{-SO}_2\text{X}$ with R^1 and X as specified and with 0.001-0.9 molar equivalents of a base, in the absence of added emulsifier; and (2) reacting said pre-emulsion with one or more perfluorinated comonomers in the absence of added emulsifier, said comonomers being perfluorinated, so as to form a fluoropolymer latex comprising a fluoropolymer wherein more than 1 mol% of monomer units are derived from $\text{CF}_2=\text{CF-R}^1\text{-SO}_2\text{X}$. See other limitations of dependent **Claims 2-42**.

6. It is noted that only dependent Claim 13 was amended to use "pre-emulsion" while no claim was canceled or added in above-mentioned amendment. In a close examination, parent **Claim 1** is related to a method of aqueous emulsion polymerization comprising two continuous steps as: (1) first forming a pre-emulsion by mixing $\text{CF}_2=\text{CF-R}^1\text{-SO}_2\text{X}$ with 0.001-0.9 molar equivalents of a base in the absence of added emulsifier, and (2) then reacting said a pre-emulsion with one or more perfluorinated comonomer(s) without adding emulsifier to form a latex. Additionally, the resultant copolymers in the latex is required to contain more than 1 mol% of monomer units derived from $\text{CF}_2=\text{CF-R}^1\text{-SO}_2\text{X}$. It is noted that unexpected results were found by the Applicants as shown on page **11** of Remarks by using partially hydrolyzed $\text{CF}_2=\text{CF-R}^1\text{-SO}_2\text{X}$ (in which it contains unhydrolyzed $\text{CF}_2=\text{CF-R}^1\text{-SO}_2\text{X}$) as well as without added surfactant to obtain perfluorinated copolymers more easily melt processed by extrusion or compression into film or membranes.

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7. In view of both 102 and 103 rejections involving Connolly reference, Connolly has disclosed the preparation of various types of copolymers containing $\text{CF}_2=\text{CF}-[\text{O}-\text{CF}_2-\text{CFY}]_n-\text{O}-\text{CF}_2\text{CF}(\text{R}_f)-\text{SO}_2\text{M}$ without any added surfactant (see working examples), wherein M can be one of -F, -OH, and $-\text{O}^-\text{Na}^+$ group and the co-monomers can be from perfluorinated monomers such as HFP (see column 2, lines 29-37, 43-45 and 55-58; also see working Example VIII on column 4, line 9-14). Connolly has also disclosed that due to decomposition of sulfonyl fluoride groups may be occurred (column 2, line 38-45), it is preferable to use a perfluorocarbon or organic solvent system (such as using perfluorodimethylcyclobutane as solvent) to polymerize or copolymerize $\text{CF}_2=\text{CF}-[\text{O}-\text{CF}_2-\text{CFY}]_n-\text{O}-\text{CF}_2\text{CF}(\text{R}_f)-\text{SO}_2\text{F}$.

In a very close examination, only such a monomer in a pure form (attention is directed to "it is not a mixture") with M being one of F, OH or $-\text{O}^-\text{Na}^+$ group is used for such a polymerization or copolymerization (see Examples V, VIII and IX-XIX). To be more specific, the monomer with sulfonyl fluoride was found to convert to the form of acid or its sodium salt completely in Example V before copolymerization with other fluorinated monomer(s). In a close examination on present application, partially hydrolyzed $\text{CF}_2=\text{CF}-\text{R}^1-\text{SO}_2\text{X}$ (in which it still contains unhydrolyzed $\text{CF}_2=\text{CF}-\text{R}^1-\text{SO}_2\text{X}$) would be obtained after the partial treatment of $\text{CF}_2=\text{CF}-\text{R}^1-\text{SO}_2\text{X}$ monomer with 0.001-0.9 molar equivalents of a base assuming the reaction is 100%. In summary, the copolymers obtained from Connolly's polymerization are quite different from those obtained by present invention.

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8. In a close examination of those many references cited in the **five IDS'** filed on June 20, May 16, April 15, March 25 and February 22 of 2005 respectively, the examiner has found only one reference (**US 4,734,474 to Hamada**) may be closer to present application. **Hamada** only discloses the preparation of copolymers containing the monomer of $\text{CF}_2=\text{CF}-\text{R}^1-\text{SO}_2-\text{Cl}$ without added surfactant (abstract, line 1-8) and such a copolymer is useful for crosslinking purpose. Hamada has also disclosed that decomposition of sulfonyl chloride groups may be occurred (column 5, line 33-35), and it is preferable to use an organic solvent system to polymerize or copolymerize such a monomer (column 5, line 34-39). However, no claimed **partially hydrolyzed** sulfonyl halide monomer is used (see preparation of the pure sulfonyl chloride from its fluoride compound with NaOH/water and then with phosphorus pentachloride on column 7, line 30-61).

Additionally, the present invention has shown in examples along with some comparative examples for making such a perfluorinated copolymer with **partially hydrolyzed $\text{CF}_2=\text{CF}-\text{R}^1-\text{SO}_2\text{X}$** (see pages 10-14 for **examples 1-2** and **comparative example 3C**). Therefore, all the above-mentioned references, in combination or alone, does not teach or fairly suggest the limitations of present invention.

9. After further examination and search, the examiner found the following prior art did not teach the claimed limitation:

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US Patent No. 6,365,769 B1 to Behr et al. discloses making a mixture of perfluoroalkyl halide compounds including linear (straight chain) and branched forms (column 3, line 22-30; abstract, line 1-5). Although telomerization procedure may be used to modify the perfluoroalkyl sulfonyl fluoride to other form (column 1, line 38 – column 2, line 48), the claimed process to first obtain partially hydrolyzed $\text{CF}_2=\text{CF}-\text{R}^1-\text{SO}_2\text{X}$ is not disclosed or suggested. Additionally, Behr is not producing copolymer at all. Therefore, Behr fails to teach or fairly suggest the polymerization process of present invention.

10. The key issue, regarding making a perfluorinated copolymer by using partially hydrolyzed $\text{CF}_2=\text{CF}-\text{R}^1-\text{SO}_2\text{X}$ by first treating with 0.001-0.9 molar equivalents of a base, cannot be overcome by any or the combination of the above references, therefore, the present invention is novel.

11. As of the date of this office action, the examiner has not located or identified any reference that can be used singularly or in combination with another reference including the above references to render the present invention anticipated or obvious to one of the ordinary skill in the art. Therefore, the independent and parent process **Claim 1** is allowed for the reason listed above. Since the prior art of record fails to teach the present invention, the remaining pending dependent **Claims 2-42** are passed to issue.

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12. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Dr. Henry S. Hu whose telephone number is **(571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The fax number for the organization where this application or proceeding is assigned is (703) 872-9306 for all regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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August 4, 2005



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